IV. CLAIMS

What is claimed is:

1. A method of assessing the efficacy of an immune response to a selected antigen in a subject comprising

    a. introducing into the subject the antigen,

    b. collecting a tissue sample from the subject, and

    c. detecting the presence of VLA-1+ (positive), antigen-specific T-cells in the sample, the presence of VLA-1+ (positive) antigen-specific T-cells indicating an effective immune response in the subject.

2. The method of claim 1, wherein the antigen is a viral antigen.

3. The method of claim 1, wherein the viral antigen is selected from the group consisting of Herpes Simplex virus-1, Herpes Simplex virus-2, Varicella-Zoster virus, Epstein-Barr virus, Cytomegalovirus, Human Herpes virus-6, Variola virus, Vesicular stomatitis virus, Hepatitis A virus, Hepatitis B virus, Hepatitis C virus, Hepatitis D virus, Hepatitis E virus, Rhinovirus, Coronavirus, Influenza virus A, Influenza virus B, Measles virus, Polyomavirus, Human Papilomavirus, Respiratory syncytial virus, Adenovirus, Coxsackie virus, Dengue virus, Mumps virus, Poliovirus, Rabies virus, Rous sarcoma virus, Reovirus, Yellow fever virus, Ebola virus, Marburg virus, Lassa fever virus, Eastern Equine Encephalitis virus, Japanese Encephalitis virus, St. Louis Encephalitis virus, Murray Valley fever virus, West Nile virus, Rift Valley fever virus, Rotavirus A, Rotavirus B, Rotavirus C, Sindbis virus, Simian Immunodeficiency virus, Human T-cell Leukemia virus type-1, Hantavirus, Rubella virus, Simian Immunodeficiency virus, Human Immunodeficiency virus type-1, and Human Immunodeficiency virus type-2.

4. The method of claim 1, wherein the viral antigen is an Influenza-A viral antigen.

5. The method of claim 1, wherein the antigen is a bacterial antigen.

6. The method of claim 5, wherein the bacterial antigen is selected from the group consisting of *M. tuberculosis, M. bovis, M. bovis* strain BCG, BCG substrains, *M. avium, M. intracellulare, M. africanum, M. kansasii, M. marinum, M. ulcerans, M. avium* subspecies *paratuberculosis, Nocardia asteroides*, other *Nocardia* species, *Legionella pneumophila*, other *Legionella* species, *Salmonella typhi,* other *Salmonella*

species, *Shigella* species, *Yersinia pestis, Pasteurella haemolytica, Pasteurella multocida,* other *Pasteurella species, Actinobacillus pleuropneumoniae, Listeria monocytogenes, Listeria ivanovii, Brucella abortus,* other *Brucella* species, *Cowdria ruminantium, Chlamydia pneumoniae, Chlamydia trachomatis, Chlamydia psittaci, Coxiella burnetti,* other *Rickettsial* species, *Ehrlichia* species, *Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pyogenes, Streptococcus agalactiae, Bacillus anthracis, Escherichia coli, Vibrio cholerae, Campylobacter* species, *Neiserria meningitidis, Neiserria gonorrhea, Pseudomonas aeruginosa,* other *Pseudomonas* species, *Haemophilus influenzae, Haemophilus ducreyi,* other *Hemophilus species, Clostridium tetani,* other *Clostridium* species, *Yersinia enterolitica,* and other *Yersinia species.*

7. The method of claim 1, wherein the antigen is a fungal antigen.
8. The method of claim 7, wherein the fungal antigen is selected from the group consisting of *Candida albicans, Cryptococcus neoformans, Histoplama capsulatum, Aspergillus fumigatus, Coccidiodes immitis, Paracoccidiodes brasiliensis, Blastomyces dermitidis, Pneomocystis carnii, Penicillium marneffi,* and *Alternaria alternata.*
9. The method of claim 1, wherein the antigen is a parasitic antigen.
10. The method of claim 1, wherein the parasitic infection can be selected from the group consisting of *Toxoplasma gondii, Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae,* other *Plasmodium* species, *Trypanosoma brucei, Trypanosoma cruzi, Leishmania major,* other *Leishmania* species, *Schistosoma mansoni,* other *Schistosoma* species, and *Entamoeba histolytica.*
11. The method of claim 1, wherein the antigen is a cancer-related antigen.
12. The method of claim 11, wherein the antigen is related to a cancer selected from the group consisting of lymphomas (Hodgkins and non-Hodgkins), B cell lymphoma, T cell lymphoma, myeloid leukemia, leukemias, mycosis fungoides, carcinomas, carcinomas of solid tissues, squamous cell carcinomas, adenocarcinomas, sarcomas, gliomas, blastomas, neuroblastomas, plasmacytomas, histiocytomas, melanomas, adenomas, hypoxic tumors, myelomas, AIDS-related lymphomas or sarcomas, metastatic cancers, bladder cancer, brain cancer, nervous system cancer, squamous cell carcinoma of head and neck, neuroblastoma/glioblastoma, ovarian cancer, skin cancer, liver cancer, melanoma, squamous cell carcinomas of the mouth, throat,

larynx, and lung, colon cancer, cervical cancer, cervical carcinoma, breast cancer, epithelial cancer, renal cancer, genitourinary cancer, pulmonary cancer, esophageal carcinoma, head and neck carcinoma, hematopoietic cancers, testicular cancer, colo-rectal cancers, prostatic cancer, or pancreatic cancer.

13. -The method of claim 1, wherein the antigen is an Alzheimer's related antigen.

14. The method of claim 1, wherein the antigen is an amyloid antigen.

15. The method of claim 1, wherein the tissue sample is blood.

16. The method of claim 1, wherein the tissue sample is obtained by pulmonary lavage.

17. The method of claim 1, wherein the tissue sample is obtained by tissue biopsy.

18. The method of claim 1, wherein the tissue sample is a non-lymphoid tissue sample.

19. The method of claim 1, wherein the antigen-specific T cells are peripheral memory T cells.

20. The method of claim 1, wherein the tissue sample is collected 6-10 days after the antigen introduction.

21. The method of claim 1, wherein the tissue sample is collected 10-14 days after the antigen introduction.

22. The method of claim 1, wherein the tissue sample is collected 14-21 days after the antigen introduction.

23. The method of claim 1, wherein the tissue sample is collected 21-30 days after the antigen introduction.

24. The method of claim 1, wherein the tissue sample is collected 30-60 days after the antigen introduction.

25. The method of claim 1, wherein the tissue sample is collected 2-6 months after the antigen introduction.

26. The method of claim 1, wherein the subject is a non-primate.

27. The method of claim 1, wherein the subject is a primate.

28. The method of claim 27, wherein the subject is a human.

29. The method of claim 1, wherein the efficacy is measured by immunohistochemistry.

30. The method of claim 1, wherein the efficacy is measured by flow cytometry.

31. The method of claim 1, wherein antigen specificity of the T-cells is detected by positive tetramer staining.

32. The method of claim 1, further comprising detecting the presence of one or more of CD45RO, CD45RA, CD44, CD62L, CD27, and CD43 on the VLA-1+, antigen-specific T-cells.
33. The method of claim 1, further comprising quantifying the level of VLA-1+ antigen-specific T-cells in the sample, an increased level as compared to a control level indicating the sufficiency of the immune response in the subject.
34. A method of screening for an antigen that elicits a sufficient immune response in a subject comprising
    a. introducing into the subject the antigen to be tested,
    b. collecting a tissue sample from the subject, and
    c. measuring VLA-1+ (positive), antigen-specific T-cells in the sample, a high level of VLA-1+ (positive) antigen-specific T-cells as compared to a control sample indicating an antigen that elicits an immune response in the subject.
35. A method a treating a subject with a disease comprising administering to the subject an antigen identified by the method of claim 34, wherein the antigen is related to the disease.
36. A method of isolating from a donor subject VLA-1+ (positive), antigen-specific T-cells comprising
    a. introducing into the subject a selected antigen,
    b. collecting a tissue sample from the subject, and
    c. isolating VLA-1+ (positive), antigen-specific T-cells from the sample.
37. A method a treating a subject with a disease comprising administering to the subject VLA-1+ (positive), antigen-specific T-cells isolated from a donor subject VLA-1+ (positive), antigen-specific T-cells isolated by the method of claim 36.
38. The method of claim 37, wherein the disease is a viral infection.
39. The method of claim 38, wherein the viral infection can be selected from the list of viruses consisting of Herpes Simplex virus-1, Herpes Simplex virus-2, Varicella-Zoster virus, Epstein-Barr virus, Cytomegalovirus, Human Herpes virus-6, Variola virus, Vesicular stomatitis virus, Hepatitis A virus, Hepatitis B virus, Hepatitis C virus, Hepatitis D virus, Hepatitis E virus, Rhinovirus, Coronavirus, Influenza virus A, Influenza virus B, Measles virus, Polyomavirus, Human Papilomavirus,

Respiratory syncytial virus, Adenovirus, Coxsackie virus, Dengue virus, Mumps virus, Poliovirus, Rabies virus, Rous sarcoma virus, Reovirus, Yellow fever virus, Ebola virus, Marburg virus, Lassa fever virus, Eastern Equine Encephalitis virus, Japanese Encephalitis virus, St. Louis Encephalitis virus, Murray Valley fever virus, West Nile virus, Rift Valley fever virus, Rotavirus A, Rotavirus B, Rotavirus C, Sindbis virus, Simian Immunodeficiency virus, Human T-cell Leukemia virus type-1, Hantavirus, Rubella virus, Simian Immunodeficiency virus, Human Immunodeficiency virus type-1, and Human Immunodeficiency virus type-2.

40. The method of claim 38, wherein the virus is Influenza-A virus.

41. The method of claim 37, wherein the disease is a bacterial infection.

42. The method of claim 41, wherein the bacterial infection can be selected from the list of bacterium consisting of *M. tuberculosis, M. bovis, M. bovis* strain BCG, BCG substrains, *M. avium, M. intracellulare, M. africanum, M. kansasii, M. marinum, M. ulcerans, M. avium* subspecies *paratuberculosis, Nocardia asteroides*, other *Nocardia* species, *Legionella pneumophila*, other *Legionella* species, *Salmonella typhi,* other *Salmonella* species, *Shigella* species, *Yersinia pestis, Pasteurella haemolytica, Pasteurella multocida,* other *Pasteurella species, Actinobacillus pleuropneumoniae, Listeria monocytogenes, Listeria ivanovii, Brucella abortus,* other *Brucella* species, *Cowdria ruminantium, Chlamydia pneumoniae, Chlamydia trachomatis, Chlamydia psittaci, Coxiella burnetti*, other *Rickettsial* species, *Ehrlichia* species, *Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pyogenes, Streptococcus agalactiae, Bacillus anthracis, Escherichia coli, Vibrio cholerae, Campylobacter* species, *Neiserria meningitidis, Neiserria gonorrhea, Pseudomonas aeruginosa,* other *Pseudomonas* species, *Haemophilus influenzae, Haemophilus ducreyi,* other *Hemophilus species, Clostridium tetani,* other *Clostridium* species, *Yersinia enterolitica, and* other *Yersinia species*.

43. The method of claim 37, wherein the disease is a fungal infection.

44. The method of claim 43, wherein the fungal infection can be selected from the group consisting of *Candida albicans, Cryptococcus neoformans, Histoplama capsulatum, Aspergillus fumigatus, Coccidiodes immitis, Paracoccidiodes brasiliensis, Blastomyces dermitidis, Pneomocystis carnii, Penicillium marneffi, and Alternaria alternata.*

45. The method of claim 37, wherein the disease is a parasitic infection.

46. The method of claim 45, wherein the parasitic infection can be selected from the group consisting of *Toxoplasma gondii*, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, other *Plasmodium* species., *Trypanosoma brucei*, *Trypanosoma cruzi*, *Leishmania major*, other *Leishmania* species., *Schistosoma mansoni*, other *Schistosoma* species., and *Entamoeba histolytica*.
47. The method of claim 37, wherein the disease is a cancer.
48. The method of claim 47, wherein the cancer is can be selected from the group consisting of lymphomas (Hodgkins and non-Hodgkins), B cell lymphoma, T cell lymphoma, myeloid leukemia, leukemias, mycosis fungoides, carcinomas, carcinomas of solid tissues, squamous cell carcinomas, adenocarcinomas, sarcomas, gliomas, blastomas, neuroblastomas, plasmacytomas, histiocytomas, melanomas, adenomas, hypoxic tumors, myelomas, AIDS-related lymphomas or sarcomas, metastatic cancers, bladder cancer, brain cancer, nervous system cancer, squamous cell carcinoma of head and neck, neuroblastoma/glioblastoma, ovarian cancer, skin cancer, liver cancer, melanoma, squamous cell carcinomas of the mouth, throat, larynx, and lung, colon cancer, cervical cancer, cervical carcinoma, breast cancer, epithelial cancer, renal cancer, genitourinary cancer, pulmonary cancer, esophageal carcinoma, head and neck carcinoma, hematopoietic cancers, testicular cancer, colo-rectal cancers, prostatic cancer, or pancreatic cancer.
49. The method of claim 37, wherein the disease treated is an inflammatory condition.
50. The methods of claim 49, wherein the inflammatory condition can be selected from the group consisting of asthma, systemic lupus erythematosus, rheumatoid arthritis, reactive arthritis, spondylarthritis, systemic vasculitis, insulin dependent diabetes mellitus, multiple sclerosis, experimental allergic encephalomyelitis, Sjögren's syndrome, graft versus host disease, inflammatory bowel disease including Crohn's disease, ulcerative colitis, ischemia reperfusion injury, myocardial infarction, Alzheimer's disease, transplant rejection (allogeneic and xenogeneic), thermal trauma, any immune complex-induced inflammation, glomerulonephritis, myasthenia gravis, cerebral lupus, Guillaine-Barre syndrome, vasculitis , systemic sclerosis, anaphylaxis, catheter reactions, atheroma, infertility, thyroiditis, ARDS, post-bypass syndrome, hemodialysis, juvenile rheumatoid, Behcets syndrome, hemolytic anemia, pemphigus, bulbous pemphigoid, stroke, atherosclerosis, and scleroderma.
51. The method of claim 37, wherein the disease treated is Alzheimer's disease

52. The method of claim 37, wherein the antigen-specific T-cells are peripheral memory T cells.